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ANNOTATED BIBLIOGRAPHY OF MASTERS THESES AND DOCTORAL DISSERTATIONS ON NATIVE CALIFORNIA AMPHIBIANS AND REPTILES, 1935-1990

by

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Inland Fisheries

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ABSTRACT

Forty-eight masters theses and 125 doctoral dissertations focusing on life history aspects of California's native herpetofauna are summarized. Abstracts of papers from "Dissertations Abstracts" and "Masters Abstracts" are annotated. Papers from "American Doctoral Dissertations" did not contain an abstract, so are simply listed and denoted with an asterisk. The Inland Fisheries Division Endangered Species Project library and staff also provided some references not found in the above sources. The number of pages is included when provided by the abstracting service. An alphabetized list of authors is also included.

[1/]Inland Fisheries Administrative Report No. 95-6. Submitted August 1994. Edited by Betsy Bolster, Department of Fish and Game, 1701 Nimbus Road, Suite C, Rancho Cordova, California, 95670.

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INTRODUCTION

We compiled this bibliography to assist biologists and others who conduct research or status surveys and develop management plans for amphibians and reptiles. It is not intended to be a complete review of readily available literature. It does, however, provide a source document for relatively obscure research on California's native herpetofauna.

METHODS AND MATERIALS

Sixty-seven masters theses and 140 doctoral dissertations focusing on life history aspects of California's native herpetofauna were summarized. References used include "Masters Abstracts" (1962-1990), "Dissertation Abstracts" (1860-1990), "American Doctoral Dissertations" (1935-1982), all published by University Microfilms International. We also utilized the Inland Fisheries Division Endangered Species Project library and staff.

Papers were selected by scanning the zoology or biology section of the index. We annotated only those references pertinent to management of California's native species. We did not include research topics on native species that were wholly focused on physiology.

Papers obtained from "American Doctoral Dissertations" contained no annotation, so are simply referenced and denoted with an asterisk. The number of pages is included if present in the original citation.

Native species were determined using Jennings (1987).

Bibliograpic entries are divided into two main categories: Amphibians and Reptiles. Amphibians are subdivided into Salamanders, Toads and Frogs. Reptiles are subdivided into Lizards, Snakes and Turtles/Tortoises.

An alphabetized list of authors and their annotation number appears at the end of the bibliography.

Only completed theses and dissertations are included in the bibliography.

ANNOTATIONS

Amphibians

Salamanders

1. Alvarado, R. H. 1962. Osmotic and ionic regulation in Ambystoma tigrinum. PhD. Washington State University. 131 p.

This study attempts to establish some of the basic features of osmotic and ionic regulation in larval and adult forms of a caudate amphibian, Ambystoma tigrinum. Most of the work was done on the larval form and attention was primarily focused on sodium metabolism.

2. *Anderson, J. D. 1960. A comparative study of coastal and montane populations of Ambystoma macrodactylum. PhD. University of California, Berkeley.

3. *Anderson, P. R. 1968. The reproductive and developmental history of the California tiger salamander. M.A. Fresno State College, Fresno, California.

4. Atkinson, M. J. 1985. A comparative study of feeding behavior in Ambystoma. EdD. Ball State University. 48 p.

Six species of Ambystoma: A. jeffersonianum, A. maculatum, A. opacum, A. texanum, A. tigrinum and A. tremblayi were exposed ten times each to four stimuli; non-moving, moving, olfactory and seismic. Only A. tigrinum moved toward the stimuli. This aggressive behavior is thought to be the reason for A. tigrinum's wide distribution as compared to the distribution of the other species studied.

5. Beatty, J. J. 1979. Morphological variation in the clouded salamander, Aneides ferreus (Cope) (Amphibia: Caudata: Plethodontidae). PhD. Oregon State University. 103 p.

Ten populations of A. ferreus were analyzed for morphological variation among populations and regions. Populations sampledwere from California, Oregon, and Vancouver Island. Karyotypic variation allows assignment of individuals to one of the three regions with a high degree of certainty.

6. Brodie, E. D. Jr. 1969. Geographic variation and systematics of the western Plethodon. PhD. Oregon State University. 129 p.

Range maps are provided and geographic variation is discussed for Plethodon vandykei vandykei, P. v. idahoensis, P. larsilli, P. dunni, P. vehiculum, P. stormi, P. elongatus and an undescribed form. Emphasis is on costal groove and tooth number, but other factors are considered. Pigmentation of each species is described and a key is provided.

7. Brown, C. W. 1970. Hybridization among the subspecies of the plethodontid salamander, Ensatina eschscholtzii. PhD. University of California, Berkeley. 190 p.

Hybridization of the seven subspecies of Ensatina eschscholtzii is examined. These subspecies are: E. e. picta, oregonensis, xanthoptica, and eschscholtzii along the coastal mountains of Washington, Oregon, and California; and E. e. platensis, xanthoptica, croceater, and klauberi in interior mountains of California. Hybrids were determined through analysis of color patterns and electrophoretic analysis of blood serum proteins.

8. Clothier, G. W. 1971. Aerial and aquatic respiration in the neotenic and transformed pacific giant salamander, Dicamptodon ensatus (Eschscholtz). PhD. Oregon State University. 98 p.

Aerial and aquatic respiration of transformed and neotenic Dicamptodon ensatus were studied. Conclusions were: 1) total aerial oxygen uptake increased with temperature for unrestrained neotones but was not affected by temperature in transformed D. ensatus; 2) stress affected neotones'cutaneous respiration and transformed pulmonary system; and 3) the transformed adult has a more efficient pulmonary system above 5°C than the neotone. These results correlated well with the ecology of D. ensatus.

9. *Cohen, N. W. 1956. The reproductive system of the male neotenic Dicamptodon ensatus (Eschscholtz). PhD. Oregon State University.

10. Darrow, T. D. 1967. Orientation and navigation in the rough-skinned newt, Taricha granulosa. PhD. Oregon State University. 74 p.

Between June, 1964 and June 1966, 4,577 newts were marked and released at three ponds 1.5-3.5 miles apart. The newts were released at varying distances from their home to see if they would return. Newts returned from distances of up to 3.5 miles and were able to orient in an enclosure which excluded the influence of any odors emanating from their home pond. Prior research indicates olfaction is of primary importance in navigation. Indications of this study are that vision as well as odor may play a significant role in navigation of this species during its breeding migrations.

11. Davis, T. M. 1991. Natural history and behaviour of the clouded salamander _Aneides ferreus_ Cope. MS. University of Victoria (Canada). 164 p.

Aneides ferreus was studied using a mark-recapture study and behavioral observations in a laboratory. No evidence was found that _A. ferreus_ was territorial or that intraspecific competition was strong.

12. Ducey, P. K. 1988. Variation in the anti-predator behavior of _Ambystoma_ salamanders. PhD. University of Michigan. 167 p.

Differences in response to predators were measured between adults and juveniles and between different predators. Evolutionary changes in predator response were also measured by examinating outgroup taxa behavior on an independently derived cladogram.

13. *Dumas, P. C. 1953. Sympatric ecological relations of _Plethodon dunni_ and _Plethodon vehiculum_. PhD. Oregon State University. 66 p.

14. Eagleson, G. W. 1978. The possible causes of "Metamorphic failure" in the urodele amphibian, _Ambystoma gracile_ (Baird). PhD. Simon Fraser University (Canada).

Field and laboratory investigations were carried out on two populations of _Ambystoma gracile_ from two different altitudes. Under identical water, feeding and photoperiod conditions there was a greater tendency towards "metamorphic failure", or neotony, in the high altitude population compared to the low altitude population. Genetically determined physiological differences are involved.

15. Edwards, J. L. 1976. A comparative study of locomotion in terrestrial salamanders. PhD. University of California, Berkeley. 322 p.

Cinematography was used to study locomotor patterns in 48 species from the three families of derived terrestrial salamanders (Salamandridae; Ambystomatidae; Plethodontidae). Limb movements, gait, propulsive pattern and lateral bending were described for each animal. There are two general body forms: robust, with short trunks, long legs, and large feet; and elongate, with longer trunks, reduced legs, and small feet.

Body form was the most important determinant of all locomotor parameters. Differences between taxonomic groups can be explained by the body forms of the contained members.

16. *Feaver, P. E. 1971. Breeding pool selection and larval mortality of three California amphibians: *Ambystoma tigrinum californiense* Gray, *Hyla regilla* Baird and Girard, and *Scaphiopus hammondii* Girard. M.S. Fresno State College, Fresno, California.

17. Feder, M. E. 1977. Bioenergetics of lungless salamanders (Caudata: Plethodontidae). PhD. University of California, Berkeley. 139 p.

Oxygen consumption and field body temperatures in three groups of salamanders (two lungless, one with lungs) were studied to test the hypothesis that lunglessness limits salamanders to small size and cool temperatures. This was not found to be the case. Small size and cool body temperature may be adaptations for low energy expenditure.

18. Ferguson, D. E. 1957. The geographic variation and distribution of the long-toed salamander, *Ambystoma macrodactylum* (Baird). PhD. Oregon State University. 94 p.

The known distribution of *Ambystoma macrodactylum* is presented and the nomenclatural history is reviewed. Four groups, based on adult color pattern, are presented: eastern Oregon, western Oregon, Crater Lake, and Montana. Life history data are compared between the four groups. Relationships of

subspecies are discussed and a key to adult animals is given.

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19. *Gilbert, W. M. 1937. Amphisexuality and sex differentiation in Ambystoma. PhD. The University of Iowa.

20. *Gorman, J. B. Jr. 1955. Biosystematic studies of the salamanders of the genus Hydromantes. PhD. University of California, Berkeley. 105 p.

21. Hanlin, H. G. 1980. Geographic variation in Dunn's salamander, Plethodon dunni Bishop (Amphibia: Caudata: Plethodontidae). PhD. Oregon State University. 86 p.

Electrophoresis was used to examine genetic variation in 12 populations of Plethodon dunni to determine any geographic trends. It was concluded that this geographically restricted species (found west of the Cascades from Pacific County, Washington to Del Norte County, California) is characterized by small, local populations with little gene flow.

22. Hedgecock, D. 1974. Protein variation and evolution in the genus Taricha (Salamandridae). PhD. University of California, Davis. 155 p.

Starch-gel electrophoresis was used to study the protein variation and evolution of Taricha granulosa, T. rivularis, T. torosa torosa, and T. t. sierra.

23. *Hendrickson, J. R. 1952. Studies on the salamander genus Batrachoseps. PhD. University of California, Berkeley. 66 p.

24. *Lowe, C. H. 1951. Speciation and ecology in salamanders of the genus Aneides. PhD. University of California, Los Angeles.

25. McKenzie, D. S. 1970. Aspects of the autecology of the plethodontid salamander Aneides ferreus. PhD. Oregon State University. 114 p.

Clouded salamanders, Aneides ferreus, collected in western

Oregon were utilized in laboratory experiments and simulated field conditions to learn more about their ecology. There was a significant selection pattern of leaf litter types by size class and temperature. The effects of size,

temperature, and feeding regime on respiratory rate were noted. Detailed analysis of dorsal and ventral color patterns were used to describe population characteristics. Reproduction, breeding season, natality and mortality were also examined.

26. McKenzie, T. L. 1974. Effects of temperature on movement of selected food items in the digestive tract of *Ensatina eschscholtzi oregonensis* (Girard). M.A. California State University, Sacramento. 30 p.

The effect of temperature on variation in movement of ingested food was examined. The relationship between amount or degree of sclerotization and rate of and the differences in food movement following heavy and light feeding were examined and discussed for known food items in the stomach of *Ensatina eschscholtzi oregonensis*.

27. Packer, W. C. 1959. The breeding migration and spatial localization in the newt, *Taricha rivularis*. PhD. Stanford University. 88 p.

This study focused on understanding the movements of *Taricha rivularis*. An attempt was made to 1) determine if various climatic factors influence the magnitude or direction of migratory movement, 2) define the range and magnitude of the terrestrial and aquatic movements of individual animals, and 3) find evidence of homing ability during the aquatic breeding period.

Rain, temperature, and humidity are important factors affecting migration. Rain is the most important with temperature and humidity becoming as important when rain is not present. Newts appear to exhibit breeding site fidelity. If artificially translocated, they apparently detect (by unknown means) that they are not in their home area, and attempt to return to it.

28. Parker, M. S. 1992. Feeding ecology of larvae of the Pacific giant salamander (*Dicamptodon tenebrosus*). PhD. University of California, Davis. 141 p.

Results of dietary analysis revealed that D. tenebrosus consumes a wide variety of sizes of aquatic and terrestrial food items. High dietary overlap from larvae to adult size indicates an apparent lack of food resource partitioning.

29. Pierce, B. A. 1980. The relationship of electrophoretically detectable protein variation to morphological and life history characteristics in the tiger salamander, Ambystoma tigrinum. PhD. University of Colorado at Boulder. 138 p.

There are seven subspecies of Ambystoma tigrinum, each of which varies in morphology, timing of metamorphosis, neotony, color pattern, reproductive cycle, size and ecology. Electrophoresis, used to examine genetic variation at eight loci, showed no significant difference between neotonic and metamorphosing populations. There was a significant amount of genetic variation in populations from differing geographical locations, even when the distance between populations was very short. Large and small morphs had no significant genetic differences.

There was a positive correlation between growth rate and heterozygosity ranking early in the larval period in neotonic forms. This suggests overall enzyme heterozygosity may be important to fitness. The conclusion of this study was that there was little concordance between protein and morphological diversity.

30. Reed, R. J. 1982. Reproductive ecology and migratory activity of Ambystoma macrodactylum croceum. M.S. University of California, Davis. 78 p.

The Valencia Lagoon population of Ambystoma macrodactylum croceum was studied from October 1977 to June 1979. Aspects researched include reproductive migration, structure and condition of the breeding population, larval development and the terrestrial distribution of this population.

31. *Reimer, W. J. 1956. Variation and systematic relationships within the salamander genus Taricha. PhD. University of California, Berkeley.

32. *Rosenthal, G. M. Jr. 1954. The role of moisture and temperature in the local distribution of the plethodontid salamander Aneides lugubris. PhD. University of California, Berkeley.

33. Smith, J. M. 1967. The respiratory ecology of the rough skinned newt, Taricha granulosa (Skilton). PhD. Oregon

State University. 83 p.

Respiratory changes during migration of _Taricha granulosa_ in the Wilamette Valley were examined. Upon leaving their ponds in late summer, pulmonary respiration increased and cutaneous respiration decreased. The reverse was true for winter when newts went back to their ponds. Overall, respiration rate was higher in winter than summer.

34. Wake, D. B. 1964. Comparative osteology and evolution of the lungless salamanders, family Plethodontidae. PhD. University of Southern California. 450 p.

The family Plethodontidae is the largest, most diverse, and most advanced group of salamanders. The osteology of all 23 genera and 130 of the 175 species was studied in an attempt to elucidate evolutionary relationships, trends, and patterns, and to propose theories concerning biogeography and phylogeny of the family.

A detailed analysis of the osteology of plethodontid salamanders is presented. The evolution of each osteological character is considered, and special emphasis is placed on anterior cranial elements, hyobranchial apparatus, vertebral column, and mesopodial elements. Some nonosteological characters are considered.

35. Whitford, W. G. 1964. Pulmonary and cutaneous gas exchange in salamanders. PhD. University of Rhode Island. 108 p.

Most amphibians use skin, lungs, and buccopharyngeal mucosa as respiratory surfaces. This study was conducted to evaluate the role of these surfaces in the gas exchange of salamanders with respect to the ecology and distribution of the forms studied.

There was no significant difference in the relationship of body weight to surface area in the species of salamanders studied. Lunged salamanders had higher oxygen consumption than the lungless plethodontids. This indicates that in these salamanders, metabolism is not directly related to surface area, and that metabolism may be more closely related to respiratory surface area.

36. Yanev, K. P. 1978. Evolutionary studies of the plethodontid salamander genus _Batrachoseps_. PhD. University of California, Berkeley. 251 p.

The geographic variation of salamanders of the genus Batrachoseps is studied through genetic, osteological, and morphological variation. Species examined include: B. attenuatus, B. nigriventris, B. pacificus pacificus, B. p. major, and B. p. relictus.

Toads

37. Anderson, D. L. 1967. Summer polysaccharide and lipid reserves in Bufo cognatus. PhD. University of South Dakota. 104 p.

    The effects of low temperature, photoperiod, and nutritional status on the seasonal disposition of carbohydrate and lipid reserves in Bufo cognatus were studied. Liver glycogen reserves were low during spawning, but increased in late summer. Experimental toads in continuous darkness stored lipids while those in continuous light metabolized them. There was no change in liver glycogen levels in response to photoperiod in immature individuals. This is thought to be a significant factor in defining the ecological niche of immature B. cognatus.

38. Bogart, J. P. 1959. Chromosomal evidence for evolution in the genus Bufo. PhD. University of Texas at Austin. 227 p.

    Chromosomes from fifty Bufo spp. and 175 hybrids were obtained by squashing corneal or tadpole epithelial cells. Secondary constrictions, chromosome number, and the species which produce normal diploid hybrids were used to outline evolution in the genus Bufo.

39. Brown, H. A. 1966. Temperature adaptation and evolutionary divergence in allopatric populations of the spadefoot toad, Scaphiopus hammondii. PhD. University of California, Riverside. 128 p.

The spadefoot toad, Scaphiopus hammondii, shows a disjunct distribution wherein California populations breed in the winter yet southeastern Arizona populations breed in the summer. Tadpole temperature tolerance indicated that Arizona tadpoles are more resistant to high temperatures than California tadpoles. Tadpole temperature tolerance is naturally high and only slightly changed by acclimation.

Thus, the tadpoles show a non-labile physiological adaptation

representing adaptation to an environment characterized by great fluctuation in temperature.

The mating call is very different between Arizona and California *S. hammondii*. The difference is attributed to the presence of a second closely related species (*S. bombifrons*) in the Arizona populations of *S. hammondi*. Thus, the call of Arizona *S. hammondi* has changed through selection for call specificity while California *S. hammondi* have not changed because of the assumed absence of closely related species of spadefoot toads.

40. Carey, C. 1976. Thermal physiology and energetics of boreal toads, *Bufo boreas boreas*. PhD. University of Michigan. 195 p.

This study tested the physiological responses of boreal toads (*Bufo boreas boreas*) to temperature. A population from 3050 m elevation was studied under field conditions after acclimation to 10,20, or 30°C or to a 12 hour cycle of 5-30°C. In the field there was a large diurnal fluctuation of body temperature (20-30°C in 24 hours), nighttime body temperature from 0-10°C and daytime 15-33°C. Evaporative water loss rates increased with skin temperature. Toads selected temperatures averaging 24°C in a thermal gradient. Digestive rates of *B. b. boreas* were temperature dependent. Thermal compensation plays a minimal role in the physiological response to temperature in boreal toads.

41. Ferguson, J. H. 1965. Evolutionary relationships of the toads of the *Bufo punctatus* group. PhD. University of Arizona. 107 p.

The evolutionary relationships of the *Bufo punctatus* group of toads were investigated by hybridization experiments, and the analysis of their mating calls, morphology and ecology. The results of reciprocal hybridization experiments agreed favorably with the data derived from the other methods of analysis. It was demonstrated that the species group clearly consists of the following taxa: *Bufo punctatus*, *B. kelloggi*, *B. debilis* and *B. retiformis*.

42. Fish, J. L. 1972. Growth and survival of anuran tadpoles

(*Bufo boreas* and *Rana aurora*) in relation to acute gamma radiation, water temperature and population density. PhD. Washington State University. 91 p.

Tadpoles were placed in continuous flow laboratory chambers using a randomized block design. The tadpoles were exposed to from 0-2000 Roentgen of radiation at temperatures of 15, 20, or 25°C at four densities (5,15,35 or 100 animals). Each cell contained 0.5 gallons of water and the tadpoles were raised for 28 days.

_R_. _aurora_ was more sensitive to radiation than _B_. _boreas_. Densities greater than 35 tadpoles affected growth and survival. Radiation damage was greater at higher densities. High temperature enhanced growth and survival while it caused radiation damage to be accelerated. The three-way interaction of these variables was not conclusively demonstrated.

43. Guttman, S. I. 1967. Evolution of blood protein within the cosmopolitan toad genus _Bufo_. PhD. The University of Texas. 165 p.

Vertical starch-gel electrophoresis of the blood proteins of fifty-seven species of _Bufo_ indicated that this biochemical technique is of little value in elucidating phylogenetic relationships above the level of the species group. In this study, intraspecific qualitative differences in total plasma patterns and in the patterns of specific proteins were not attributable to nongenetic factors.

44. Hamilton, K. F. 1970. Evaporative cooling as a thermoregulatory agent in the toad, _Bufo boreas_. M.A. California State College, Fullerton. 64 p.

A comparison was made of the body temperature profiles, body weights, and body fluid concentrations for some toads, _Bufo boreas_, experiencing heat stress. Variables were availability of environmental and bladder water resources and the potential for evaporation from body surfaces.

Changes in body weight and body fluid concentration were used to show differences between the various test conditions. Toads were able to maintain their body temperature below prevailing ambient temperatures. The use of grease to restrict body surface evaporation significantly reduced the toads' ablility to maintain lowered body temperatures.

45. *Karlstrom, E. L. 1957. Ecological and systematic relationships within the toad genus _Bufo_ in the Sierra Nevada

of California. PhD. University of California, Berkeley.

46. Krupa, J. J. 1987. Mate choice and mate location tactics in the great plains toad (Bufo cognatus). PhD. University of Oklahoma. 107 p.

This study examined the potential of mate selection by the male, and male posture during amplexus that afforded the highest fertilization success. Attraction tactics used by calling males and satellite males are also discussed.

47. Martin, R. F. 1969. Evolution in the toad genus Bufo: evidence from osteology. PhD. University of Texas at Austin. 114 p.

Sixty-five species of Bufo were examined to see if osteological evidence could be linked with existing systematic data. Considerable intraspecific variation was found.

48.McClanahan, L. L. Jr. 1966. Adaptations of the spadefoot toad, Scaphiopus couchi, to desert environments. PhD. University of California, Riverside. 70 p.

Water conservation, urea storage, and electrolyte balance in burrowed toads was investigated in the field and in the lab. By storing urea, toads conserve water that otherwise would be lost through urination. Once emerged, toads resist dehydration by replacing evaporative water lossed with stored bladder water. Water deficient toads may be able to fully rehydrate in soil.

49. Newman, R. A. 1987. The evolutionary ecology of Scaphiopus couchi (Anura: Pelobatidae) larval development in ephemeral desert ponds. PhD. University of Pennsylvania. 203 p.

The existence of phenotypic plasticity and genetic variation in the development of tadpoles in short duration ponds and long duration ponds is discussed. The conclusion: a single genotype is not flexible enough to have equally high fitness in both pond types, even though the genotype may be capable of adaptive plasticity.

50. Northen, P. T. 1970. The geographic and taxonomic relationships of the great basin spadefoot toad,

Scaphiopus intermontanus, to other members of the subgenus spea. PhD. The University of Wisconsin. 229 p.

This study was conducted to determine whether *Scaphiopus intermontanus* was a valid biological species. Mating calls, male calling behavior, and differences in breeding season served to isolate it from genetic mixing with *S. hammondii* and *S. bombifrons*. This study concluded that *S. intermontanus* constitutes a valid biological species.

51. Richman, J. B. 1976. Hemoglobins of the western toad, *Bufo boreas*. M.A. California State University, Fullerton. 91 p.

Hemoglobins from Western toads, *Bufo boreas*, from California, Oregon and the Rocky Mountains were characterized by their isoelectric points. Oxygen affinities were also determined for each population.

52. Rogers, J. S. 1971. Biochemical and morphological variation in two species of toads, *Bufo cognatus* and *B. speciosus*. PhD. University of Texas at Austin. 94 p.

Electrophoretic analysis of six proteins was used to assess genetic variation in *Bufo cognatus* and *B. speciosus*. Several external measurements were used to gauge morphological variation. Gene flow was shown to occur from *B. speciosus* to *B. cognatus*, but not vice versa.

53. Samallow, P. B. 1979. Dynamics of enzyme polymorphism in a natural population of the boreal toad, *Bufo boreas boreas* Baird and Girard: Evidence of natural selection via differential mortality in early life history stages. PhD. Oregon State University. 190 p.

The genetic effects of high mortality during early life history stages in *Bufo boreas boreas* were investigated by examining variation at nine polymorphic enzyme coding loci. Gene and genotype frequencies were determined in 27 samples of pre-reproductive *Bufo* from three cohorts over three years and two samples of adults over two years.

Heavy, early life history stage mortality is characteristic of *B. b. boreas* and it was concluded that this was not genetically random.

A list of electrophoretic techniques useful with *B. b. boreas* and data regarding genetic analysis of electrophoretic phenotypes of *B. b. boreas* are included.

54. Schuierer, F. W. 1966. Environmental effects on the plasma proteins of *Bufo boreas*. PhD. Stanford University. 134 p.

Electrophoresis was used to examine the change in percent composition of plasma protein fractions as a response to physio-environment factors such as activity, water load, lack of food, and habitat in *Bufo boreas*. A mechanism is shown to exist that could be of great adaptive value to a species with a wide distribution of diverse habitats, such as *B. boreas*. Specifically, the mechanism builds up one fraction needed for osmoregulation at the expense of one of the other blood protein components.

55. Sherman, C. K. 1980. A comparison of the natural history and mating system of two anurans: Yosemite toads (*Bufo canorus*) and black toads (*Bufo exsul*). PhD. The University of Michigan. 410 p.

Yosemite toads (*Bufo canorus*) from Tioga Pass, California and black toads (*B. exsul*) from Deep Springs Valley were permanently marked. Life history characters and mating systems were recorded and compared.

56. Smith, H. C. 1975. Reproductive cycles of *Bufo woodhousii* and *Acris gryllus* in Northern Mississippi, with additional notes on *Pseudacris triseriata* and *Hyla chrysoscelis*. PhD. Mississippi State University. 96 p.

Aspects of the reproductive cycles of *Bufo woodhousii* and *Acris gryllus* are compared. Both species have a single annual spermatogenic cycle. There are two activity peaks in *A. gryllus*, one in spring and one in fall. *B. woodhousii* has only one peak, this difference attributed to the fact that *B. woodhousii* has a shorter breeding period than *A. gryllus*. *A. gryllus* ovary weight is highest in spring and the increase in fat body size is used as a food reserve for the yolking of next seasons eggs. *B. woodhousii* ovary weight does not change seasonally, thus yolking occurs throughout the year. Fat utilization differed between the species because *B. woodhousii* females are active before breeding, and *A. gryllus* females breed immediately after hibernation.

57. Sullivan, B. K. 1983. Sexual selection and mating system variation in the great plains toad (*Bufo cognatus* Say) and Woodhouse's toad (*Bufo woodhousii australis* Shannon

and Low). PhD. Arizona State university. 138 p.

The breeding behavior of _Bufo_ _cognatus_ and _B_. _woodhousii_ _australis_ was compared. Variation in advertisement calls, length of breeding aggregation, and female mate selection patterns were discussed.

58. *Thronton, W. A. 1954. Population relations and isolation mechanisms in _Bufo_ _woodhousei_ and _Bufo_ _valliceps_. PhD. University of Texas at Austin.

59. Vandergrift, R. L. 1971. The physiological effects of dehydration in the toad, _Bufo_ _boreas_. M.A. California State College, Fullerton. 75 p.

Bufo _boreas_ tolerance to evaporative water loss was examined in relation to the distribution of water in the fluid compartments, concentration of plasma osmolytes, concentration of tissue electrolytes, tissue electrolytes, tissue water content and systolic blood pressure in hydrated and dehydrated toads. It was discovered that skeletal muscles contribute largely to the total water loss, whereas other tissues were capable of maintaining tissue water even at extreme water deficits.

60. *Wasserman, A. O. 1956. Factors affecting interbreeding in sympatric and allopatric species of spadefoot toad (Genus _Scaphiopus_). PhD. University of Texas at Austin.

61. Worrest, R. C. 1975. Effects of enhanced mid-ultraviolet radiation (290-315 nm) on development and survival of boreal toad (_Bufo_ _boreas_ _boreas_) tadpoles. PhD. Oregon State University. 130 p.

More than 3700 fertilized toad eggs were exposed to either "white light" flourescent lamps or "white light" flourescent lamps plus flourescent sunlamps. Filters were used to provide only transmission of UV-B light (290-315 nm). Daily exposures ranged from chronic to varied.

Exposures of 11 sunburn units of UV-B per day increased mortality and resulted in numerous defects. Daily exposure at 4.4 sunburn units only lengthened metamorphosis time.

Frogs

62. Akin, G. C. 1965. Self-inhibition of growth in Rana pipiens tadpoles. PhD. Tulane University. 50 p.

Inhibition of the growth rate of Rana pipiens tadpoles occurs when they are reared under crowded conditions. Although all animals in a group originally may be the same weight and age, differences in growth rate soon become apparent. Slower growing members of a group may be so severely retarded that they fail to survive unless they are removed from the group. This inhibition of growth is known as the crowding phenomenon. The same adverse effect on growth occurs when individual tadpoles are reared in water previously occupied by growing tadpoles of the same species. It is hypothesized that a substance produced by the tadpoles works in conjunction with an unidentified algae produces the crowding effect.

63. Allan, D. M. 1975. An analysis of vocalizations and female discriminatory response in the Pacific treefrog, Hyla regilla. M.A. California State University, Fullerton. 70 p.

An analysis of three distinct breeding calls of Hyla regilla was made in relation to temperature. Discrimination experiments were also conducted to assess the responsiveness of gravid females to natural calls and synthetic signals.

64. Anderson, G. A. 1964. Digenetic trematodes of Ascaphus truei in western Oregon. PhD. Oregon State University. 102 p.

Ascaphus truei in western Oregon were examined for presence of digenetic trematodes. This species was found to be a definite host for two intestinal digenetic trematodes, Tetracheilos ascaphi and Cephalouterina dicamptodoni. It is also an intermediate host for two digenetic trematodes, Euryhelmis squamula and E. pacificus, that encyst in subcutaneous connective tissue.

65. Bradford, D. F. 1982. Oxygen relations and water balance during hibernation, and temperature regulation during summer, in a high-elevation amphibian (Rana muscosa). PhD. University of California, Los Angeles. 191 p.

Metamorphosed frogs and tadpoles were observed under conditions of experimental hibernation. Tadpoles showed advantages over frogs such as lower critical oxygen tension and lower oxygen consumption at their critical oxygen tension. Tadpoles are also able to obtain nutrients by active feeding while in a state of hibernation, while adult frogs are not. Adult frogs, however, are able to maximize body temperature through behavioral modulation, while tadpoles are not.

66. Brownell, J. A. 1961. A study of the food of Rana catesbeiana Shaw. M.A. Sacramento State College. 37 p.

A study of two dissimilar areas in the Sacramento Valley to examine the food habits of adult and juvenile Rana catesbeiana. The most common food and that most important by weight is given. There is some discussion of the food habits.

67. Bury, R. B. 1967. The distribution and ecology of the tailed frog, Ascaphus truei Stejneger, in California. M.A. Sacramento State College. 21 p.

Localities of the tailed frog, Ascaphus truei Stejneger were studied in relation to temperature and rainfall. Twenty-seven new localities were found and studied. It was found that Ascaphus truei is not known from areas of less than 40 inches of annual precipitation and is seldom exposed to temperatures over 15°C. Food habits were also investigated. Associated herpetofauna: Thamnophis sirtalis, T. elegans, Dicamptodon ensatus, and Rhyacotriton olympicus.

68. Case, S. M. 1976. Evolutionary studies in selected North American frogs of the genus Rana (Amphibia: Anura). PhD. University of California, Berkeley. 169 p.

Western North American Rana evolutionary relationships were studied using several biochemical techniques. The two areas of emphasis were: 1) an assessment of genic variation in R. boylei and R. muscosa and 2) analysis of relations among all species native to western North America. A synopsis of the evolution of the genus Rana in North America is presented.

69. Claussen, D. L. 1971. A comparative study of the thermal and water relations of the tailed frog, Ascaphus truei

and the pacific tree frog, Hyla regilla. PhD. University of Montana. 138 p.

This study compared physiological and behavioral differences which restrict Ascaphus truei to cold mountain streams, but allow Hyla regilla to be eurytopic.

70. Daugherty, C. H. 1979. Population ecology and genetics of Ascaphus truei: An examination of gene flow and natural selection. PhD. University of Montana. 151 p.

Five hundred marked Ascaphus truei were studied at Butler Creek, Montana. Mature frogs exhibited limited movement along the stream (<40m over 2-4 yrs), thus indicating gene flow among populations was limited.

Protein variation among these populations was examined at 25 loci. Amount of variation was directly related to the degree of geographic and historic isolation. Two major groups emerged, rocky mountain and coastal-cascade. Genetic divergence between these groups was comparable to the level normally assigned to separate species.

The primary influence on divergence is natural selection, since gene flow is limited. Inter-population gene exchange does not seem to inhibit local adaptive variations in morphology and life history.

71. *Haertel, J. D. 1970. A comparative study of the chromosomes from five species of the genus Rana. PhD. Oregon State University. 38 p.

72. Haro, R. T. 1969. The effects of nickel on the developing embryo of the frog (Rana pipiens). M.A. Sacramento State College. 49 p.

Rana pipiens embryos were exposed to nickel at critical stages in their development. It was found that nickel causes defects such as failure to gastrulate, abnormal neural formation, head malformations and spina bifida, and retarded growth. The findings establish nickel as a toxicant and a teratogen to Rana pipiens.

73. Morey, S. R. 1983. Evidence for predation as a selection factor in an anuran color polymorphism. M.A. California State University, Fullerton. 75 p.

Using matching backgrounds and selective predation experiments, evidence for predation by garter snakes was

found to be a selection factor in the crypic polymorphic system of the pacific treefrog, *Hyla regilla*.

There was significant interaction between frog color and background selected. Garter snakes appeared able to select morphs of *H. regilla* whose hue, but not lightness, contrasted with the background.

74. *O'Hara, R. K. 1981. Habitat selection behavior in three species of anuran larvae: Environmental cues, ontogeny and adaptive significance. PhD. Oregon State University, Corvalis.

75. Pytel, B. A. 1985. Morphological and biochemical systematics of the eastern North American frogs of the genus *Rana*. PhD. New York University. 134 p.

Twelve species of *Rana*, *R. aurora*, *R. boylii*, *R. catesbeiana*, *R. clamitans*, *R. grylio*, *R. heckscheri*, *R. palustris*, *R. pipiens*, *R. septentrionalis*, *R. sylvatica*, *R. utricularia* and *R. virgatipes*, were studied using electrophoretic analysis and osteological characters. Conclusions concerning species relationships are discussed.

76. *Ritland, R. M. 1954. Studies on the morphology and natural history of *Ascaphus truei* Stejneger. PhD. Harvard University.

77. Roberts, J. O. 1970. Variations in salinity tolerance in the pacific treefrog, *Hyla regilla*, in Oregon. PhD. Oregon State University. 58 p.

Salinity tolerance of eggs, larvae and adults of four subspecies of *Hyla regilla* was examined, by subjection to salt stress in a series of graded seawaters. In all cases adults were more tolerant than larvae and larvae more tolerant than eggs. *H. r. pacifica*, which occurs west of the Oregon Coast Range, was more salt tolerant at all stages than the three other Oregon subspecies.

78. Schmid, W. D. 1962. Some aspects of the water economies of nine species of anuran amphibians. PhD. University of Minnesota. 68 p.

The water economics of nine species of anurans, including *Rana septentrionalis*, *R. clamitans*, *R. pipiens*, *R. sylvatica*,

Hyla versicolor, *H. crucifer*, *Pseudacris nigrita*, *Bufo americanus* and *B. hemiophrys*, were studied in regard to (1) response to controlled dessication stress, (2) effective osmolarity of blood plasma, (3) permeability of skin to water, (4) rate of sodium transport by the skin, and (5) response to controlled hydration stress. These nine species were chosen as experimental animals because of availability and wide variation in habitat preference.

79. Seibel, R. V. 1968. Some variables affecting the critical thermal maximum of the leopard frog, *Rana pipiens* Schreber. M.A. California State University, Fullerton. 40 p.

Groups of *Rana pipiens* were acclimated to a variety of conditions to test their effect on the critical thermal maximum (CTM). At low acclimation temperatures the CTM was lowered. At high acclimation temperatures, the CTM was raised. Fed frogs have a higher CTM than starved frogs. Large frogs have a higher CTM than small frogs. The CTM of frogs acclimated to fluctuating temperatures is the same as for frogs acclimated to a constant high temperature.

80. Sype, W. E. 1975. Breeding habits, embryonic thermal requirements and embryonic and larval development of the cascade frog, *Rana cascadae* Slater. PhD. Oregon State University. 120 p.

The breeding habits and embryonic thermal requirements of the cascade frog are described. Pre-feeding stages had a temperature tolerance between 6 and 27°C. As the embryos matured, this range widened.

The breeding strategy apparently provides an environment for maximum heat utilization to accomodate faster development. As a result, *R. cascadae* suffers significant embryonic losses from freezing temperatures and dessication. Forty-six stages of development are described.

81. *Turner, F. B. 1958. The ecology and morphology of *Rana*

pretiosa pretiosa in Yellowstone Park Wyoming. PhD. University of California, Berkeley. 172 p.

82. *Walker, C. F. 1935. The generic relations of the North American terrestrial Hylidae, Pseudacris. PhD. The University of Michigan.

83. *Zweifel, R. G. 1954. Ecology, Distribution and Systematics in the Boylei group of the genus Rana. PhD. University of California, Berkeley.

Reptiles

General

84. Peredo, S. F. 1978. Integumental pigmentation in reptiles. M.A. California State University, Long Beach. 112 p.

This thesis reviews and discusses the information available on the cytological and physiological basis of integumental pigmentation in reptiles.

85. *Sanders, R. M. 1950. A herpetological survey of Ventura County, Ca. M.S. Stanford University, Stanford, California.

Lizards

86. Adest, G. A. 1978. The relations of the sand lizards Uma, Callisaurus, and Holbrookia (Sauria: Iguanidae): an electrophoretic study. PhD. UCLA. 131 p.

Starch gel electrophoresis was used to compare proteins of representative subspecies and species of Callisaurus, Cophosaurus, Holbrookia, and Uma to each other and to an outgroup, Sceloporus poinsetti.

In the genera Callisaurus and Cophosaurus the genetic differentiation was not significantly different from zero for either. The genus Holbrookia showed H. maculata and H. propinqua to be more closely related than either H. lacerata. Southwestern subspecies of H. maculata were distinct from those from the northeastern of its range. Five species of

Uma revealed three groups. *U. exsul* and *U. paraphygas* were well differentiated from each other and from the three California species (*U. inornata*, *U. notata*, and *U. scoparia*) which this author feels should be listed as a single species. Overall *Callisaurus* and *Cophosaurus* were the most closely related taxa. The biogeography of sand lizards is also discussed.

87. Asplund, K. K. 1968. Evolution of body size and habitat selection in whiptail lizards. PhD. University of California, Los Angeles. 138 p.

There appears to be a correlation between body size and habitat selection in certain groups of whiptail lizards (Teiidae: Cnemidophorus) that inhabit the western deserts of North America. Largest forms are distributed with the densest vegetation types. Juveniles of a given species are more restricted to open areas within a habitat than are adults.

Shuttling behavior and heat exchange were studied in the laboratory. Between closely related and within species, larger lizards spend more time in the shade than do smaller lizards following an initial basking period. This applies to the duration of single forays into the shade and to the budgeting of activity during the total activity period of any one day. Small and large lizards maintained similar body temperatures in spite of differences of behavior.

Physiological properties of body size related to the gain and loss of metabolic heat may account in part for the observed behavioral differences. During forced activity under florescent lighting, larger lizards maintain higher body temperatures than do smaller lizards. The temperature differences so induced could possibly bias the utilization of shade differently between lizards having different body sizes.

In whiptail lizards, small size is adaptively related to a desert physiognomy. It appears that in at least two lineages, whiptails have evolved smaller body size as a response to the increasing aridity and decreasing vegetational density of the late Pleistocene and recent periods.

88. Babb, C. R. 1976. Imitative learning in the desert iguana, Dipsosaurus dorsalis. M.A. California State University, Fullerton. 46 p.

The author found that observational learning can occur in desert iguanas in a reinforcement test. More imitation occurs when reinforcement was supplied to naive lizards while observing experienced lizards.

89. Barber, B. J. 1976. A theoretical and experimental analysis of behavioral temperature regulation in the lizard Dipsosaurus dorsalis. PhD. University of Kentucky. 214 p.

This study attempted to answer three questions: 1) Do lizards regulate their body temperature? 2) What is the nature of the regulator? 3) Which body temperatures do they regulate?

Based on theoretical analysis and experimental results, this study concluded that: 1) D. dorsalis behaviorally regulates body temperature. 2) The thermoregulator is dual-limit in nature (as opposed to a linear proportional stimulus-response relationship). 3) The shell temperature is regulated.

90. Batcha, N. 1972. Tolerance of various lizard species to low temperatures. M.A. California State University, Sacramento. 47 p.

Tests were performed on 36 lizards of ten species to examine their tolerance to cold temperatures. It was found that the lethal temperature mean was -5.3°C. The physiological critical temperature minimum (CT_{min}) was the lowest temperature that a lizard could tolerate with no body damage. The physiological CT_{min} varied according to species. There was no indication of physiological control of body temperature in a cold environment.

91. Beck, D. D. 1991. Physiological and behavioral consequences of reptilian life in the slow lane: ecology of beaded lizards and rattlesnakes. PhD. University of Arizona. 181 p.

Radiotelemetry was used to study the Mexican beaded lizard (Heloderma horridum) and three species of rattlesnake. Activity patterns, home range, thermal biology, habitat and resource use and behavior were determined. Metabolic rates were measured in the lab to determine energy use.

92. Bell, E. L. 1954. A taxonomic and evolutionary study of the western fence lizard, Sceloporus occidentalis, and its relationship to the eastern fence lizard, Sceloporus undulatus. PhD. University of Illinois at Urbana-Champaign. 170 p.

No intergradation was found between Sceloporus occidentalis and S.

undulatus although there is an overlap in range.

Distribution, scale counts, body measurements and coloration were used to determine intergradation among the six subspecies of *S. occidentalis*.

93. Benes, E. S. 1966. Progressive color discrimination in the lizard, *Cnemidophorus tigris* (Teiidae). PhD. University of California, Davis. 103 p.

Twelve *Cnemidophorus tigris* were kept in separate cages in a temperature controlled room under standard lighting and fed meal worms against a background of Munsell standardized color discs. They were divided into two groups to see if a preference existed for feeding from red or green discs. A preference for green was found. Once learned it was harder to unlearn and there was a greater tendency for those who learned to feed on red to change to green.

94. *Berry, K. H. 1972. The ecology and social behavior of the chuckwalla *Sauromalus obesus*. PhD. University of California, Berkeley.

95.Bissell, G. E. 1979. The effects of reduced environmental temperature and aggressive display on the body temperature of the lizard *Sceloporus occidentalis occidentalis* Baird and Girard. M.A. California State University, Sacramento. 21 p.

Experiments were performed with 12 lizards in 145 encounter situations to observe body temperature changes. This was to examine the ability of male individuals of *Sceloporus occidentalis* to increase body temperature as a result of an encounter with another male at ambient temperatures below the preferred activity range for this species. Males were capable of increasing body temperature due to aggression. Below 23.5°C, aggressive behavior is subjugated in favor of thermal regulatory behavior.

96. Bondello, M. C. 1977. The effects of high intensity motorcycle sounds on the acoustical sensitivity of the desert iguana, *Dipsosaurus dorsalis*. M.A. California State University, Fullerton. 50 p.

Study indicates a loss of acoustical sensitivity when the lizard is exposed to motorcycle sounds of 114 decibels on the "A" scale for one and ten hours. The recovery phase exceeds seven days or the loss may be permanent for both the one and

ten-hour exposed lizards. Subjects exposed for ten hours suffered the greatest permanent loss.

97. *Bostic, D. L. 1964. The ecology and behavior of *Cnemidophorus hyperythrus beldingi* Cope (Sauria: Teiidae). M.A. San Diego State Univeristy, San Diego, California.

98. Burkholder, G. L. 1973. Life history and ecology of the Great Basin sagebrush swift, *Sceloporus graciosus graciosus* Baird and Girard, 1852. PhD. Brigham Young University. 213 p.

Sceloporus graciosus graciosus was studied for three years in the transitional life zone of central Utah. It was found in association with Gambel's oak, bigtooth maple, and sagebrush. *S. g. graciosus* was an opportunistic feeder. Sexual maturity was reached at 22-23 months. Females laid one clutch per year with an average of 6.03 eggs per female. Growth and home range were equal until maturity, when females got larger and males increased their home range. Density was 66 individuals per hectare. Mean cohort generation time was 30.13 months.

99. Burrage, B. R. 1966. Natural history of the western ground Uta, *Uta stansburiana hesperis* Richardson (Sauria: Iguanidae). M.S. San Diego State University. 294 p.

The natural history of *Uta stansburiana hesperius* was examined. Topics covered include thermoregulation, activity patterns, social structure of populations, territoriality and reproduction.

100. Carpenter, G. C. 1992. Aspects of dominance in tree lizards (*Urosaurus ornatus*) I. Assessing the relative influence of multiple factors on dominance and II. The ontogeny of a dominance signal. PhD. New Mexico State University. 96 p.

Two populations of *Urosaurus ornatus* that differ in morphological and social traits were used in comparative studies of 1) relative influence of variable characteristics on dominance relations and 2) ontogenic development of throat coloration.

101. Clarke, R. F. 1963. An ethological study of the iguanid lizard genera Callisaurus, Cophosaurus, and Holbrookia. PhD. The University of Oklahoma. 144 p.

Social and display behavior of each species of iguanid lizard genera Holbrookia, and Cophosaurus and Callisaurus occurring in the United States were studied, both in the field and enclosed groups of captive individuals.

102. Coleman, P. R. 1966. Infrared reflection and transmittance of the integument of live Sceloporus occidentalis occidentalis Baird and Girard from three habitats. M.A. Sacramento State College.

Integument reflectance and transmittance of three wavelengths (826, 925, and 1035 mu) in the infrared spectrum of live Sceloporus occidentalis occidentalis from three habitats were studied. Differential reflectances suggest differential utilization of radiant solar energy by the Sierra population as compared to utilization by the valley and coast populations. It is suggested that adaptation to various lengths of exposure to the sun's radiation may be responsible for the differences noted. No significant differences in transmittance were found.

103.Cowen, S. M. 1973. Summer and winter daily activity patterns of the granite spiny lizard, Sceloporus orcutti under conditions of constant temperature and light. M.A. California State University, Fullerton. 69 p.

Laboratory tests with an actograph suggest that circadian rhythms in Sceloporus orcutti are endogenous. Activity patterns may be dependent on a combination of temperatures and light cues.

104. Deslippe, R. J. 1989. Population structure, territoriality, and social behavior of three species of iguanid lizrds. MS. University of Windsor (Canada). 225 p.

This study was conducted in the Colorado National Monument, Fruita, Colorado. Three lizards, Sceloporus graciosus, S. undulatus, and Urosaurus ornatus were observed both in laboratory and field situations.

105. Dewitt, C. B. 1963. Behavioral thermoregulation in the iguanid lizard, Dipsosaurus dorsalis. PhD. University of Michigan. 102 p.

Behavioral thermoregulation in the desert iguana (Dipsosaurus dorsalis) has been analyzed under laboratory conditions at the University of Michigan, and under both field and laboratory conditions at Palm Desert, Riverside County, California, where the Deep Canyon Mobile Desert laboratory of the University of California, was located. A variety of techniques for continuously recording body, soil, and air temperature were employed.

Desert iguanas exercise control over their body temperature by appropriate adjustment of their position in gradients of temperature. The preferred level of body temperature is 38.5°C for desert iguanas in a thermal gradient where substrate temperatures ranged from 30 to 50°C.

Temperatures in the native environment of desert iguanas during summer days quickly reach levels too high to permit regulation of body temperatures at the preferred level. Desert iguanas did not immediately retreat to burrows under these conditions, but stayed above ground until they became heated to 43-44°C. On the hottest summer days, this temperatures tolerance above the preferred range may increase the time suitable for activity above ground from 0.5 to about 3 hours. This has the obvious advantage of prolonging the period in which feeding and other necessary activities can be conducted. This behavior may be one of the major factors allowing this lizard to occupy hot deserts.

106.*Dixon, J. R. 1962. The systematics and zoogeography of the north and central American lizards of the genus Phyllodactylus. PhD. Texas A&M University.

107. Dupre, R. K. 1983. The influence of hydration state on the thermal relations of the desert iguana, Dipsosaurus dorsalis. PhD. University of Kentucky. 120 p.

This study examined the autonomic and behavioral thermogregulation of the desert iguana, Dipsosaurus dorsalis, in response to water stress.

108. Durtsche, R. D. 1988. Foraging and food of the fringe-toed

lizard, Uma inornata, an endangered species from the Coachella Valley, California. M.A. California State University, Fullerton. 165 p.

This study concludes that Uma inornata is omnivorous with 62.8% of the diet being plant matter. Previous studies suggested U. inornata is insectivorous. U. inornata employed

a sit-and-wait foraging mode like most iguanid lizards. Proposals for future studies are presented.

109. Duvall, D. J. 1980. Pheromonal mechanisms in the social behavior and communication of the western fence lizard, Sceloporus occidentalis biseriatus. PhD. University of Colorado at Boulder. 104 p.

The ability of adult western fence lizards (Sceloporus occidentalis biseriatus) to recognize and respond to conspecific pheromones was explored. Behaviors related to recognition such as push-ups and licking are described and discussed.

110. Engbretson, G. A. 1971. The effects of aggressive display on body temperature in the fence lizard Sceloporus occidentalis occidentalis Baird and Girard. M.A. Sacramento State College. 23 p.

A study was performed to examine what effect aggressive display had on the body temperature of male fence lizards. It was found that two males in the presence of one another can raise their body temperature without any physical activity by as much as 3°C. There is some discussion as to the reasons for this rise in temperature.

111. Etheridge, R. E. 1960. The relationships of the anoles (Reptilia: Sauria: Iguanidae): An interpretation based on skeletal morphology. PhD. University of Michigan. 249 p.

This study was concerned with variation in the skeletal morphology and other anatomical features of iguanid lizards. Its purpose was to determine the relationships of the genera and species of anoles to one another and to other members of the Iguanidae. By the application of soft (low voltage) x-ray photography to this problem, new information on the iguanid skeleton was obtained and taxonomic characters never before employed in Saurian classification were revealed.

112. Evans, K. J. 1964. Effects of cyclic light and temperature on the locomotor activity of the lizards *Uta stansburiana* and *Coleonyx variegatus*. PhD. University of California, Riverside. 92 p.

This study was undertaken to determine whether lizards from the two thermoregulatory groups, heliotherms and non-

heliotherms, might show differences in the control of the phase of daily activity relative to the daily environmental cycles of light and temperature.

The biological clock was found to control activity in relation to daily environmental rhythm in *Coleonyx variegatus*, a nocturnal non-heliotherm. The phase of activity rhythm of *Uta stansburiana*, a diurnal heliotherm, did not appear to be controlled by the biological clock, but exhibited a marked temperature dependence and light independence that would not be predicted on the basis of one prominent theory. It was suggested that (1) regulation of the phase of *Uta*'s activity rhythm is achieved through the relationship of activity to body temperature and that (2) a change in body temperature depends upon emergence. If emergence is a clock-regulated activity, then locomotor activity rhythm is effectively controlled by the biological clock.

113. Ferguson, G. W. 1969. Geographic variation and evolution of stereotyped behavioral patterns of the side-blotched lizards of the genus *Uta* (Iguanidae). PhD. The University of Michigan. 105 p.

Four stages of *Uta* mating behavior are described: approaching, licking, neck-holding, and copulation. These mating behaviors and push-up displays were used to describe geographic variation of the genus *Uta*.

114. Fogg, K. L. 1973. Microhabitat selection and related biology of the granite night lizard. M.A. California State University, Fullerton. 51 p.

The study found that *Xantusia henshawi* selects for six parameters of microhabitat in the field. They are: width of crack, angle of surface, chip thickness, chip surface area, and the size of the boulder. It also selects for cracks which were not in northerly directions, rock surfaces which are clean of debris and in the sun. Experiments in the laboratory found preferred substrate and crack temperatures.

115. Fusari, M. H. 1982. The oxygen consumption and water balance of the California legless lizard, *Anniella pulchra*. PhD. University of California, Los Angeles. 93 p.

Rates of oxygen consumption, rates of and mechanisms for water gains in wet sand, rates of evaporative water loss,

estimated water budgets and soil moisture selection of California legless lizards were determined through experimentation.

116. Gates, G. O. 1963. Ecology of the Iguanid lizard, *Urosaurus graciosus*, in Arizona. PhD. The University of Arizona. 270 p.

A three part study is presented on *Urosaurus graciosus* and *U. ornatus* in Arizona: 1) comparative ecology of *U. graciosus* and *U. ornatus* in an area of sympatry, 2) demographic aspects of the ecology of *U. graciosus*, and 3) thermo-regulation in *U. graciosus*.

117. Gelderloos, O. G. 1970. Comparative study of circadian activity patterns of the desert iguana (*Dipsosaurus dorsalis*) under self-selected and imposed illuminations. PhD. Northwestern University. 127 p.

Desert iguanas were experimentally placed in a situation of constant, imposed light and in a light preference chamber to compare circadian activity cycles. The lizards tended to regulate their daily activity/rest cycles toward a 24-hour period when offered the opportunity through choice of light intensity. Seasonal variations in the daily activity patterns occurred in both sets of lizards.

118. Hager, S. B. 1992. Surface activity, movement, and home range of the San Diego horned lizard, *Phrynosoma coronatum blainvillii*. MA. California State University, Fullerton. 126 p.

The San Diego horned lizard, *Phrynosoma coronatum blainvillii*, was active from April to June. Males had larger home ranges than females and traveled longer distances. Hatchling sizes and growth, predation rates and scat distributions for area use were also determined.

119. Harwood, R. H. Jr. 1978. The effect of temperature on the digestive efficiency of three species of lizards, Cnemidophorus tigris, Gerrhonotus multicarinatus, and Sceloporus occidentalis. PhD. University of California, Los Angeles. 130 p.

Reptiles are primarily ectothermic but do maintain some degree of control over their body temperature during active periods. This study was developed to help determine the

physiological advantages of maintaining body temperature at specific levels.

Digestion under known thermal conditions was used to determine digestive efficiency, or Apparent Digestiblility Coefficient (ADC), the percent of energy assimilated.

The three lizards studied have three different temperature preferences. Both S. occidentalis and C. tigris showed increased ADC when temperature was increased from 26.2-33.4°C and 25.1-38.4°C, respectively. G. multicarinatus, which is eurythermal, showed a constant ADC over a 18.1-29.9°C range.

120. Hillman, P. E. 1974. Simulation and modeling of transient thermal responses of the western fence lizard, Sceloporus occidentalis. PhD. Washington State University. 120 p. Sceloporus occidentalis is heliothermic, i.e., it warms itself in the sun to achieve optimal physiological temperatures. An environmental chamber was set up to simulate controlled basking conditions with sunlight, substrate temperature, air temperature, wall temperature, relative humidity, and air velocity.

The model used accounts for the fact that even a lizard only 2 cm thick is not at a uniform temperature. It is shown that when S. occidentalis basks with its vent pressed to the chamber floor, its dorsal subcutaneous temperature is warmer than its ventral subcutaneous temperature. The author feels this model is more accurate than models that assume uniform temperature and is therefore a better tool for relating lizards to their thermal environments.

121. Hoffmann, M. A. 1973. Locomotor activity, body temperature, and metabolic scope in southern alligator lizard

Gerrhonotus multicarinatus webbi (Anguidae). M.A. California State University, Fullerton. 48 p.

Variation in daily locomotor activity patterns between three different constant temperatures (18, 25, and 30°C) at the same 24-hour light cycle (12L, 12D) was analogous to the seasonal variation in daily activity pattern reported for free-living *Gerrhonotus multicarinatus*. This change in daily activity time patterns has been widely attributed to a simple adherence to thermally tolerable daily "time niches". Body temperatures associated with sustained activity (29.9°C) did not differ significantly from body temperatures associated with inactivity (29.4°C) in absorptive 6 meter laboratory thermal gradients. However, body temperatures of fasted

individuals averaged significantly lower than absorptives, and were different if the lizards were active (27.8°C) or inactive (23.5°C). Metabolic scope of *G. multicarinatus* increases exponentially from about 0.11 to 1.10 ml oxygen per gram per hour from 10°C to 35°C and at the "preferred" temperature of 30°C (.5m oxygen per gram per hour) is comparable to scopes recorded for relatively active lizards.

122. Hudson, D. M. 1973. Seasonal lipid cycles in the yucca night lizard, *Xantusia vigilis*, with special reference to the adaptive significance of the tail as a fat storageorgan in lizards. M.A. California State University, Fullerton. 78 p.

Investigation of seasonal fluctuations in the weight of fat bodies and lipid content of the carcass and tail in a population of *Xantusia vigilis* from California indicates that changes are associated with vitellogenesis (production of a yolk gland) and winter survival.

123. Huey, R. B. 1990. Latitudinal variation in the ecology of a lizard: seasonal differences in mortality and physiology. PhD. University of Washington. 272 p.

This was a comparative study of activity season mortality of *Uta stansburiana*. It was based on the generally accepted hypothesis that predation rates increase toward the equator. Seven populations were studied along a latitudinal transect from central Washington to southern California. The author found high mortality due to predation in the northern populations. This may be due to a longer activity season.

124. Hunsicker, G. R. 1987. Biosystematics of _Sceloporus_ _orcutti_ and _S_. _magister_ complexes (Reptilia: Iguanidae). PhD. Loma Linda University. 225 p.

Three species of the _Sceloporus_ _orcutti_ complex, _S_. _orcutti_, _S_. _hunsaki_, and _S_. _licki_, were examined electrophoretically. The current species designations were supported.

Four species of the _S_. _magister_ complex, _S_. _rufidorsum_, _S_. _monserratensis_, _S_. _zosteromus_ and _S_. _magister_, underwent allozyme analysis. This analysis revealed _S_. _magister_, the United States species, was distinctly different from the three Baja California, Mexico species which clustered closely. The author considers the Baja group to be one species.

125. *Hunt, L. E. 1984. Morphological variation in the fossorial lizard _Anniella_. M.A. University of Kansas, Lawrence, Kansas.

126. Huntley, A. C. 1979. An electrophysiological analysis of sleep behavior in the desert iguana, _Dipsosaurus_ _dorsalis_. M.A. California State University, Fullerton. 63 p.

A four state sleep/wake cycle was defined for the desert iguana. These four states were active awake, relaxed wakeful, behavioral sleep and paradoxical sleep. The effects of day length and temperature on this circadian behavior was assessed.

127. *Kauffman, J. S. 1982. Patterns of habitat resource utilization in a population of _Uma_ _scoparia_, the Mojave fringe-toed lizard. M.S. University of Illinois, Chicago.

128. Kaufmann, J. S. 1992. Temperature and phenotypic plasticity in lizards. PhD. University of California, Irvine. 164 p.

Xantusia _vigilis_ and _Sceloporus_ _occidentalis_ were studied to investigate the role of environmental temperature in eliciting an acclimatory response and thus phenotypic plasticity. The results suggest that for some aspects of locomotor performance, the significant variation observed in lizards in nature may be partly due to variaton in the thermal environment. Morphological variation, however, is probably due to genetic factors, or environmental factors other than temperature.

129. Kechter, M. D. 1974. Microhabitat selection in the yucca night lizard *Xantusia vigilis* as related to temperature and moisture. M.A. California State University, Fullerton.

It was found that *Xantusia vigilis* prefers a plant microhabitat over rock, sand and empty areas. Also, at higher temperatures, this species prefers a moist horizontal microhabitat over a vertical one or a hole.

130. Kingsbury, B. A. 1991. The thermal ecology of the southern alligator lizard, Elgaria multicarinata. PhD. University of California, Riverside. 119 p.

Laboratory and field studies were used to determine factors responsible for the highly variable body temperature found in southern alligator lizards. The findings were that variable field body temperatures were largely due to activity during thermally suboptimal weather.

131. LaPointe, J. L. 1966. Investigation of the function of the parietal eye in relation to locomotor activity cycles in the lizard, Xantusia vigilis. PhD. University of California, Berkeley. 96 p.

The parietal eye has been shown to affect the intensity of locomotor activity of lizards. It has also been demonstrated that lizards exhibit persistent circadian locomotor activity cycles in constant light and temperature and that the period of these cycles is light-dependent. This study investigates the possibility that the parietal eye is a pathway through which light may affect three parameters, period, activity-time and intensity of the circadian locomotor activity cycles of the desert night lizard, Xantusia vigilis. A recently developed method for computer analysis of the period length of circadian rhythms of activity, periodogram analysis, is described and used in the analysis of the experiments reported here. It appears that the parietal eye has no effect on the period or activity-time of the free-running locomotor activity cycle.

132. Lashbrook, M. K. 1969. Effects of photoperiods on heat tolerance in Sceloporus occidentalis occidentalis. M.A. Sacramento State College. 39 p.

The fence lizard was studied to determine if acclimation to different photoperiods had an effect on its heat tolerance. Results show that those lizards exposed to a photoperiod of LD 16:8 had a better heat tolerance than those exposed to LD 8:16. Discussion on the significance of this and also on heat regulation in other lizards is provided.

133. Leavell, C. Z. 1972. Aspects of the natural history of the tuberculate gecko, Phyllodactylus xanti. M.A. California State University, Fullerton. 95 p.

The natural history, habitat selection, food selection, reproductive biology, and the role of the endolymphatic

apparatus in egg-laying and its seasonal variation were studied in the tuberculate gecko.

134. Licht, P. 1964. The relation between thermoregulation and physiological adjustments to temperature in lizards. PhD. The University of Michigan. 107 p.

Physiological responses to temperature on several levels of organization (the intact animal, tissue, and molecular) were examined in a variety of lizards. Optimal temperatures and heat resistances of these responses were compared with levels at which lizards regulate their body temperatures, (thermal preferenda) to gain insight concerning the nature of thermal adaptation in these reptiles. Results indicated the thermal preferendum of the lizard is closely related to the range of temperature to which it is physiologically adapted. Differences in the preferenda of lizards appeared related to differences in physiological adjustments to temperature on diverse levels of organization.

135. Limberger, P. L. 1985. A preliminary study of the micro-ornamentation of the Old World lizard family Lacertidae: Its variation and systematic implications. M.A. California State University, Fullerton. 98 p.

Micro-ornamentation patterns of body scales in 21 genera of Lacertidae were examined with a scanning electron microscope to ascertain the systematic value of the patterns. Six patterns are described. Phylogenetic alalysis of the data set before and after pattern inclusion demonstrated the importance of micro-ornamentation in systematic studies of Lacertidae.

136. Lynn, R. T. 1963. Comparative behavior of the horned lizards, genus *Phrynosoma*, of the United States. PhD. University of Oklahoma. 83 p.

Observations were made of the behavior of six of the seven species of *Phrynosoma* found in the U.S.: *P. playtrhinos*, *P. modestum*, *P. coronatum*, *P. cornutum*, *P. solare*, and *P. douglassi*.

The lizards were studied in large sheet metal enclosures, in cages, and in large terraria. The six species studied exhibited very similar behavior in all phases of their activity except the display pattern.

Observations indicate that vision is of primary importance in affecting the activity of the individual. Feeding, eliminative and defensive behavior are described.

137. *MacCoy, C. V. 1934. Lizards of the genus Sceloporus in the United States. PhD. Harvard University.

138. MacKay, W. P. 1972. Home range behavior of the banded rock lizard Petrosaurus mearnsi. M.A. California State College at Fullerton. 81 p.

Activity pattern and home range behavior of Petrosaurus mearnsi is revealed and discussed.

139. Martins, E. P. 1992. Structure, function and evolution of the Sceloporus push-up display. PhD. University of Wisconsin - Madison. 200 p.

The author studied the use of the push-up display by Sceloporus graciosus. The display was broken into postures, number of legs extended and number of head bobs. "Grammar" was suggested by certain combinations being more common. Displays were categorized as broadcast, agonistic and courtship.

140. McGinnis, S. M. 1965. Thermal ecology of the western fence lizard, Sceloporus occidentalis. PhD. University of California, Berkeley. 86 p.

Several aspects of the thermal ecology of the western fence lizard, Sceloporus occidentalis, were studied under field conditions in an outdoor enclosure, and in laboratory photothermal gradient runways. Major areas of investigation included (1) seasonal preferred body temperature, (2) hibernation, (3) variations in daily exposure to direct sunlight, (4) emergence temperature (34.5°C) and continual photothermal gradient runway conditions and (5) physiological changes induced by constant exposure to the preferred body temperature and photothermal gradient conditions.

141. McKinney, C. O. 1969. An analysis of zones of intergradation in the side-blotched lizard, Uta stansburiana (Sauria: Iguanidae). PhD. The University of Michigan. 104 p.

Analysis of the geographic variation of color pattern, morphology, electrophoretic patterns of plasma proteins, and push-up displays of three subspecies of _Uta stansburiana_ revealed two zones of intergradation. The size of these zones and reasons for restriction of gene flow across them were determined. The three supspecies examined are _U. s. stansburiana_, _U. s. elegans_ and _U. s. nevadensis_.

142. Minnich, J. E. 1968. Maintenance of water and electrolyte balance by the desert iguana, _Dipsosaurus dorsalis_. PhD. The University of Michigan. 135 p.

The water and electrolyte balance of the desert iguana, _Dipsosaurus dorsalis_, was studied under natural conditions at various times of the year in the Coachella Valley of California. Field observations were supplemented with measurements in the laboratory. A detailed study was made of microclimate, behavior and physiology.

143. Mora, J. M. 1991. Lizard community structure and long-term changes in relation to plant communities on the Welder Wildlife Refuge. PhD. Texas A & M. 115 p.

Increased rainfall and changes in range management practices since the 1960s has resulted in taller, more densely vegetated plant communities. The change has affected three lizard species that require xeric habitat: _Phrynosoma cornutum_, _Sceloporus variabilis_, and _S. undulatus_.

144. Munsey, L. D. 1974. Aspects of water metabolism in the mesic lizard, _Sceloporus occidentalis_. M.A. California State University, Fullerton.

The water budget indicated that _Sceloporus occidentalis_ can remain in positive water balance without drinking. Cutaneous evaporative loss emerged as the most critical component in the water economy. The permeability of the integument to moisture diffusion may be directly influenced by high temperatures. Restrictions of this lizard to mesic and semi- arid habitats appears to be due to the comparatively high rate of cutaneous moisture loss.

145. Muth, F. A. 1972. Thermoregulatory behavior of the zebra-tailed lizard, _Callisaurus draconoides_. M.A. California State University, Fullerton. 83 p.

The thermoregulatory behavior of the zebra-tailed lizard was examined. Thermoregulatory postures, body temperatures, behavioral sequences and emergence temperatures were determined and discussed.

146. Oliver, R. L. 1984. Aspects of the social behavior of the western banded gecko *Coleonyx variegatus* and the Texas banded gecko *Coleonyx brevis*. M.A. California State University, Fullerton. 69 p.

A behavoiral inventory describing 44 postures is presented. Male to male, male to female, and female to female encounters were recorded. Postures were analyzed to show the percent frequency of occurrence and sequential pattern.

147. *Porzer, L. M. 1982. Movements, behavior, and body temperatures of the gila monster (*Heloderma suspectum* Cope) in the vicinity of Queen creek, Arizona. M.S. Arizona State University, Tempe.

148. Rau, C. S. 1980. The genus *Urosaurus* (Reptilia, Lacertilia, Iguanidae) of Baja California, Mexico. M.S. California State University, Long Beach. 89 p.

Five species of *Urosaurus* were examined, *U. graciosus graciosus*, *U. ornatus*, *U. symmetricus*, *U. microscutatus*, *U. lahteli* and *U. nigricaudus*. These were compared morphologically to *Urosaurus* species on mainland Mexico. Included is a complete description of external morphology, geographic distribution, abundance, and behavior of each species; and a key to the species of Baja California.

149.*Reeve, W. L. 1951. A taxonomic and distributional review of the horned lizard genus *Phrynosoma*. PhD. University of Kansas.

150.*Rodgers, T. L. 1953. Responses of two closely related species of lizards (Genus *Sceloporus*) to different environmental conditions. PhD. University of California, Berkeley. 66 p.

151.Rowland, S. D. 1992. Activity, behavior, ecology, and

home range of the orange-throated whiptail, Cnemidophorus hyperythrus beldingi Cope. MA. California State University, Fullerton. 38 p. + appendices.

Seasonal activity and daily activity patterns are discussed. Activity budgets, home range, habitat preference, food and foraging, predation and interaction with cohorts are also discussed.

152. Ruppert, R. M. 1977. Comparative assimilation efficiencies of two iguanid lizards, the herbivorous chuckwalla, Sauromalus obesus and carnivorous collared lizard, Crotaphytus collaris. M.A. California State University, Fullerton. 50 p.

153. Ruth, S. B. 1977. A comparison of the demography and female reproduction in sympatric western fence lizards (Sceloporus occidentalis) and sagebrush lizards (Sceloporus graciosus) on Mt. Diablo, Ca. PhD. University of California, Berkeley. 195 p.

The life history of two sympatric species of lizard, Sceloporus occidentalis and S. graciosus was compared over a five year period at Mt. Diablo, Contra Costa County, California. Over five years, clutch size for both species remained the same with clutches averaging 10.3 eggs for S. occidentalis and 4.1 eggs for S. graciosus. One to two clutches were layed per year. Clutch weight was 17% total body weight in S. graciosus and 21% total body weight for S.occidentalis. Six percent of S. occidentalis eggs survive to one year while 16% of S. graciosus eggs survive to one year.

Sex ratios were equal in S. graciosus, but skewed toward males in S. occidentalis. Age distributions for the two species were almost identical.

S. graciosus were found on large rock outcrops, while S. occidentalis were found in medium sized rock areas. Densities were: S. occidentalis 13 per hectare and S. graciosus 16 per hectare. Densities of areas actually utilized were 22-23 per hectare and 100-157 per hectare for S. occidentalis and S. graciosus, respectively.

154. Sanborn, S. R. 1977. A comparison of arthropod abundance and food consumed by Uta stansburiana (Sauria: Iguanidae) at

the Nevada test site. M.A. California State University, Long Beach. 50 p.

Fluctuations in arthropod numbers reflected by dietary changes, indicated that the side-blotched lizard is an opportunistic feeder.

155. Sievert, L. C. 1988. Behavioral thermoregulation of the collared lizard. PhD. University of Oklahoma. 115 p.

Temperature selection of male and female Crotaphytus collaris acclimated to 25°C was measured at 24 hour periods in a thermal gradient with 1) uniform light (UL) 2) point source at hot end (LH) or 3) point source at cold end (LC). Three seasons; spring, summer and fall, had a significant effect on temperature selection.

156. Sinervo, B. R. 1988. The evolution of growth rate in Sceloporus lizards: Environmental, behavioral, maternal, and genetic aspects. PhD. University of Washington.

The causes of geographic variation in life history attributes of hatchling Sceloporus lizards are examined. Latitudinal and elevational patterns of egg life history characteristics in S. occidentalis are analyzed. Also examined is the effect of thermal environment on growth rate in S. occidentalis hatchlings. Growth rates of S. occidentalis (a low elevation species) are compared with that of S. graciosus (a high elevation species).

157. Soule, M. E. 1964. Evolution and population phenetics of the side-blotched lizards (Uta stansburiana and its relatives) on the islands in the Gulf of California, Mexico. PhD. Stanford University. 180 p.

The population biology of a widespread and common vertebrate, the side-blotched lizard (Uta stansburiana, sensu latu), was investigated in the Gulf of California region. At the outset two groups of questions were asked. One group concerned evolutionary causation on islands; more specifically, it was asked whether selection or chance factors predominate in controlling evolutionary change. The other group of questions concerned the biological significance of morphological variation, both with individuals and populations. A number of conclusions were reached and some evolutionary hypotheses and models proposed.

158.*Stebbins, R. C. 1943. Ecology of the Iguanid genus
Uma.
PhD. University of California, Los Angeles.

159. Talbot, H. E. 1962. Spectral reflectivity of the integument
of live *Sceloporus occidentalis occidentalis* Baird and
Girard from four habitats. M.A. Sacramento State College.
25 p.

An inexpensive apparatus was devised to measure spectral reflectance of any size area of the integument of live lizards and the reflectivities of Sceloporus occidentalis occidentalis from four different habitats were compared in an attempt to ascertain whether or not environmental adaptations of wavelength absorption exist. Discussion is provided on the apparatus, its construction and effectiveness. Implications of ectothermy are discussed and a short history is included. Also discussed are possible reasons for the difference in reflectivity of the specimens.

160. Taylor, C. A. IV. 1970. Some aspects of the ecology and endocrinology of the Mohave fringe-toed lizard, Uma scoparia. M.A. California State University, Fullerton. 37 p.

Field and laboratory studies were made on Uma scoparia in an attempt to determine some of the ecological factors affecting its adrenal physiology. Studies suggest that there is an afternoon increase in the levels of corticosterone present in the blood. Steroid levels are not significantly affected by sex and body temperature. The preferred body temperature (34.8-43.2°C) was thought to be affected by the level of hydration of the animal.

161. Telford, S. R. 1964. A comparative study of endoparasitism among some southern California lizard populations. PhD. University of California, Los Angeles. 279 p.

A survey of parasites of southern California lizards was conducted from March 1962 through April 1964. The families studied were Gekkonidae, Xantusiidae, Iguanidae, Teiidae, Scincidae, Anguinidae, and Anneillidae.

Differences in host parasite associations existed between sexes, age groups and altitude levels. Seasonal fluctuation and host specificity differences also occur.

162. Thompson, C. W. 1992. Behavioral ecology and endocrinology of alternative male reproductive strategies in a polymorphic lizard. PhD. Arizona State University. 163 p.

This study examines variation in throat color in male tree lizards, Urosaurus ornatus, and investigates the proximate and ultimate causation of this variation. It serves to confirm the hypothesis that throat color functions as a signal of status or fighting ability. The hypothesis that

different male color morphs may practice alternative reproductive strategies is also confirmed.

163. *Tollestrup, K. 1979. The ecology, social structure and foraging behavior of two closely related species of leopard lizards, Gambelia silus and Gambelia wislizenii. PhD. University of California, Berkeley.

164. Tremor, J. W. 1962. The critical thermal maximum of the iguanid lizard Urosaurus ornatus. PhD. University of Arizona. 96 p.

The critical thermal maximum of the tree lizard Urosaurus ornatus linearis (Baird and Girard) was determined after seasonal acclimation and thermal acclimation in the laboratory. Laboratory acclimation consisted of exposure for seven days to various constant and diurnally-cycled temperatures.

165. Tsuji, J. S. 1986. Metabolic adaptations to temperature in lizards of the genus Sceloporus from different latitudes. PhD. University of Washington. 110 p.

This study examined various hypotheses of acclimation responses to temperature by studying patterns of thermal acclimation in latitudinally separate populations of Sceloporus occidentalis from Washington and Southern California and comparing these to predictions. Magnitude of acclimation should increase with latitude and the direction of the response (increase or decrease of metabolic rate after cold exposure) should depend on whether lizards are active or hibernate in cool seasons. This study supports the theory that acclimation response depends on adaptation at different latitudes.

166. Urban, E. K. 1964. A comparative study of locomotion in some Teiid lizards. PhD. The University of Wisconsin. 187 p.

Methods are proposed whereby locomotive patterns of lizards, as observed in motion pictures, can be described quantitatively, and the patterns subsequently compared with the associated or underlying osteological and myological characters. These techniques are applied in an analysis of the locomotion of representative teiid lizards and one iguanid. Characters studied with these methods are: vertical displacement of the head; horizontal body and tail

flexion; angle of trunk from horizontal; distance of acetabulum from ground; lateral femoral movements; foot formulae; relationship of ipselateral feet; time and distance of stride; speeds; distance of distal end of leg from midventral line; stride and its associated characters; measurements of axial skeleton; and dry weights of caudifemoralis longus and femorotibialis muscles.

167. Weathers, W. W. 1969. Physiological control of rates of heating and cooling in the iguanid lizard, Dipsosaurus dorsalis. PhD. University of California, Los Angeles. 107 p.

The effect of water vapor pressure and wind velocity on heat exchange, and the relation of heart rate and cutaneous blood flow to heat exchange were examined for Dipsosaurus dorsalis.

168. Weintraub, J. D. 1968. Homing and movement patterns of Sceloporus orcutti. PhD. University of California, Riverside. 106 p.

Homing behavior and ecology of the granite spiny lizard, Sceloporus orcutti, were studied in western Riverside county, California. From November 1963 to May 1967, 382 field trips were taken, and 670 lizards were captured. These animals were marked on capture and released. Their subsequent positions in the field were recorded and a total of 2,800 sightings was obtained. Displacement experiments showed S.orcutti was able to home back to capture sites. Visual cues and past memory of terrain may explain return ability.

169. White, C. G. 1968. Temperature adjustments of Sceloporus occidentalis occidentalis to increasing environmental temperatures. M.A. Sacramento State College. 30 p.

Sceloporus occidentalis occidentalis was subjected to increasing environmental temperatures to determine the thermal effect of physiological factors when behavioral means of high temperature avoidance were eliminated. Results indicate that the lizard is able for short periods of time to adjust body

temperature in the absence of behavioral control.

170. Whitefield, C. L. 1972. Thermoregulatory patterns in several species of lizards. M.A. Sacramento State College. 72 p.

Sixty-four lizards representing four families, nine genera, and fifteen subspecies were tested for thermoregulatory patterns and the results were compared and discussed.

171. Wicknick, J. A. 1990. Intraspecific agonistic behavior of three species of alligator lizard (Sauria: Anguidae). MS. University of Texas at Arlington. 72 p.

Intraspecific behavior of representative members of three genera of alligator lizards was studied. Conclusions were that all three showed non-territoral and site-specific behaviors.

172. Willard, D. E. 1966. The thermoecology of Cnemidophorus tigris. PhD. University of California, Davis. 99 p.

A central California population of Cnemidophorus tigris was studied to determine the effect of the availability of warming sites on the number, activity and reproductive success of these lizards. A series of laboratory tests on a thermal gradient were compared with similar observations on the field. These were the results. Body temperatures and substrate temperatures are closely correlated on C. tigris. The total activity range is 33-41°C. The mean body temperature of juvenile C. tigris is 1.8°C in summer and 1.9°C cooler in fall than that of adult. All C. tigris tested selected about 3°C cooler substrates in fall than in summer. In adults, the period of high mean body temperature is correlated with interrupted foraging, low fat deposition, high sexual activity and high intraspecific interference.

173. Wone, B. 1992. Habitat requirements of the horned lizard Phrynosoma mcallii in a disturbed desert environment. MA. San Jose State University. 34 p.

The relationship between habitat features and both lizard and scat occurrence was investigated. The population studied occurred in an OHV park. Significant differences were observed between locations of lizards and locations of scat. This was determined to be due to shifts in microhabitat use. Scat were found in areas with heavy vegetative cover and rocks, and lizards were found in open, bare areas.

Snakes

174. Boundy, J. J. 1990. Biogeography and variation in southern populations of the garter snake Thamnophis atratus, with a synopsis of the Thamnophis couchii complex. MA. San Jose State University. 114 p.

Variation in five populations of Thamnophis atratus is examined based on eighteen morphological characteristics in eight geographically separate species. The presence of three subspecies is suggested and ecological and geological events responsible for subspecific differences are discussed.

175. Bowers, B. B. 1992. Habituation of antipredator behaviors and responses to chemical prey extracts in four species of garter snakes, Thamnophis (Serpentes: Colubridae). PhD. University of Tennessee. 443 p.

It was predicted that animals would be more responsive and habituate more slowly to biologically significant stimuli and that species with different ecological and behavioral traits may differ in responsiveness and propensity to habituate. Both were found to be true. Animals were found to be more responsive to biologically significant stimuli. Adults and neonates both showed significant habituation which could suggest a heritable basis for habituation rate.

176.Christensen, G. E. 1992. The feeding and foraging ecology of Diadophis punctatus, the ringneck snake. MS. Central Michigan University. 41 p.

This study was conducted at the Central Michigan University Biological Station on Beaver Island, Charlevoix County, Michigan. A semi-natural area was provided for observations. A statistically significant pattern of behavior was identified.

177. Cohen, A. C. 1972. Some factors affecting water economy in snakes. M.A. California State University, Fullerton. 47 p.

Eight parameters were tested to determine how they affected water loss in snakes. These parameters were: 1) exposed surface area, 2) flow rate, 3) temperature, 4) state of snake in shedding cycle, 5) snakes position, 6) respiratory vs. cutaneous water loss, 7) vasodilation, and 8) species

differences. Each was found to significantly affect water loss.

178. Contard, P. C. 1987. Factors influencing the skin shedding phenomenon in the garter snake *Thamnophis sirtalis*. PhD. City University of New York. 246 p.

The phases of skin shedding are discussed. The effects of thyroid hormone, environmental temperature, and ambient relative humidity on this process are examined.

179. Cross, J. K. 1979. Multivariate and univariate character geography in *Chionactes* (Reptilia: Serpentes). PhD. The University of Arizona. 540 p.

The shovel-nosed snake, *Chionactes*, was examined for 39 simple characters. A total of 1500 specimens representing all valid named forms of the Sonoran and Mojave deserts from 32 populations was utilized. Geographic variation in the characters was then examined. The phenetic relationships arrived at are placed into an historical perspective. Inundations of the Salton Basin, the course of the Colorado River and Pleistocene climatic changes are all considered in the current distributional patterns of *Chionactes*.

180. Diller, L. V. 1981. Comparative ecology of Great Basin rattlesnakes (*Crotalis viridis lutosus*) and Great Basin gopher snakes (*Pituophis melanoleucas deserticola*) and their impact on small mammal populations in the Snake River Birds of Prey Natural Area. PhD. University of Idaho. 100 p.

C. viridis and *P. melanoleucas* vary only moderately in activity and thermal ecology. Females of both species reproduce after four years and ovulation occurs in early June for both. *C. viridis* young are born in September to October, while *P. melanoleucas* hatch in October, indicating a shorter development time for live bearing *C. viridis*. Mean clutch sizes were 8.3 and 6.9 for *C. viridis* and *P. melanoleucas*, respectively.

Densities were 0.6 and 1.3 snakes per hectare for *C. viridis* and *P. melanoleucas* respectively. Distribution was patchy for

C. viridis , and uniform for P. melanoleucas. C. viridis fed almost entirely on Spermophilus townsendi while P. melanoleucas took a variety of small mammals.

181. Ford, N. B. 1979. Aspects of pheromone trailing in garter snakes. PhD. Miami University. 85 p.

The preference of males of two species of garter snake (*Thamnophis sirtalis* and *T. butleri*) to pheromone trails of conspecific females, heterospecific females and blank trails was tested. Both species preferred conspecific trails. *T. butleri* tested with *T. radix*, however, could not distinguish between conspecific trails and heterospecific trails. The author believes that the lack of evolutionary pressure for reproductive isolation has removed the need for species specificity of pheromone trails in these species.

182. Gage, C. C. 1975. Activity patterns and circadian rhythmicity of the spotted leaf-nosed snake, *Phyllorhynchus decurtatus decurtatus*. M.A. California State University, Fullerton.

The spotted leaf-nosed snake entrainment to L-D cycles and thermal cycles was investigated. It was found that locomotor activity for this species may be controlled by an endogenous biological clock, due to the length of the period of rhythmicity, its temperature independence, and the persistence of the activity pattern in constant temperature and light.

183. Gibson, A. R. 1978. The ecological significance of a colour polymorphism in the common garter snake *Thamnophis sirtalis*. PhD. University of Toronto (Canada).

A melanic (jet black) morph of *T. sirtalis*, recorded from areas of Lake Erie was studied, to determine its ecological significance. Melanics displayed thermal advantage over striped snakes both in the lab and in the field and this is presumed to help maintain the polymorphism.

184.Hansen, G. E. 1982. Life history of the California kingsnake (*Lampropeltis getulus californiae*) at a southern Sacramento Valley, California locale. M.A. Thesis. California State University, Sacramento. 110 p.

Activity cycles, home ranges, reproduction, and courting behaviors were examined for the California kingsnake, *Lampropeltis getulus californiae.*

185. Hansen, R. W. 1980. Western aquatic garter snakes in central California; an ecological and evolutionary perspective. M.A. Thesis. California State University, Fresno. 78 p.

The objectives of this study include; 1) to gather sufficient data to provide an ecological profile and define the distributional ecology of _Thamnophis couchii couchii_ and _T. c. gigas_ and 2) to determine whether the two races of _T. couchii_ intergrade presently or have in the past. This author feels that any introgression is highly unlikely and even if it occured would have been unidirectional from _T. c. couchii_ to _T. c. gigas_.

186. Hersek, M. J. 1990. Behavior of predator and prey in a highly coevolved system: Northern pacific rattlesnakes and California ground squirrels. PhD. University of California, Davis. 92 p.

Radiotelemetry was used to study movement and behavior of snakes. Both sides of this highly coevolved predator-prey relationship were examined. Snakes eat ground squirrels and the squirrels have evolved snake specific behavioral and immune defenses.

187. Kaban, L. W. 1978. A comparative study of organ placement in _Charina bottae_ and _Lichanura roseofusca_(Serpentes: Boidae). M.S. California State University, Long Beach. 77 p.

The author compares and discusses the size and placement of some visceral organs in the two species and also notes any intraspecific variation between sexes. It was found that there is significant interspecific variation but not any significant intraspecific variation.

188. *Larson, N. M. 1984. Geographic variation in the two-striped garter snake, _Thamnophis hammondii_. M.S. California State Polytechnic University, Pomona.

189. Lawson, P. A. 1991. Movement patterns and orientation mechanisms in garter snakes. PhD. University of Victoria (Canada). 180 p.

The objectives of this study were to determine movement patterns and navigational ability of _Thamnophis_ species living in a mild climate and compare with congeneric populations known to be migratory. _T_. _sirtalis_ is known to be migratory, and _T_. _ordinoides_' migratory behavior has never been recorded. Studies showed that _T_. _sirtalis_ had advanced navigational skills in displacement experiments; _T_. _ordinoides_ did not.

190. Parker, W. S. 1974. Comparative ecology of two colubrid snakes, _Masticophus_ _taeniatus_ _taeniatus_ (Hallowel) and _Pituophis_ _melanoleucas_ _deserticola_ Stejneger, in northern Utah. PhD. University of Utah. 307 p.

The demographies and life histories of desert striped whipsnakes and Great Basin gopher snakes were studied at communal hibernacula in Tooele County, Utah. Characters studied were hibernation, thermoregulation, mating, and reproduction, homing, clutch size, densities, food habits, growth rates, ecdysis and predators. Advantages and disadvantages of communal hibernation are discussed.

191. Peterson, C. R. 1982. Body temperature variation in free-living garter snakes (_Thamnophis_ _elegans_ _vagrans_). PhD. Washington State University. 186 p.

Temperature sensitive radiotransmitters surgically implanted into ten wandering garter snakes were used to describe daily and seasonal variations in body temperature under field conditions. Three patterns of daily variation are described. No seasonal patterns could be detected.

192. Philibert, R. L. 1964. The seasonal neurosecretory cycle of _Diadophis_ _punctatus_. PhD. University of Missouri. 82 p.

The seasonal cycle in the hypothalamic neurosecretory system was investigated in the ringneck snake, _Diadophis_ _punctatus_. There seems to be seasonal changes in the hypothalamic neurosecretory system that parallel the reproductive activity of the animal. The decrease in the amount of neurosecretory material in the female occurs at the time of ovulation. The reduction of this material in the male occurs simultaneously with the onset of spermatogenesis.

193. Posson, M. C. 1979. Quantitative and qualitative characteristics of the rattle sound of three species of rattlesnakes. M.A. California State University, Fullerton. 88 p.

Analyzes and discusses the rattlesounds of three species of rattlesnake, *Crotalus viridis*, *C. atrox*, and *C. cerastes* in relationship to species specificity, temperature and effects on other organisms in the rattlesnakes environment.

194. Secor, S. M. 1992. Activities and energetics of a sit-and-wait foraging snake, *Crotalus cerastes*. PhD. University of California, Los Angeles. 217 p.

The ecological significance of movements, home range size and determinates of energy expenditure were investigated for the sidewinder, a sit-and-wait foraging snake, in the eastern Mohave desert. Comparisons were made with *Masticophis flagellum*, a sympatric, actively-foraging snake.

195. Sharer, A. W. 1960. Scotopic sensitivity of snakes of the family Colubridae, with a discussion of the ecological significance of their vision. PhD. University of Michigan. 119 p.

This study has dealt with the pupillomotor sensitivity of snakes of the family Colubridae to low intensity monochromatic stimuli. The parallel between pupillomotor and retinal response indicates the utility of the former in gauging visual sensitivity. As histological findings have indicated the absence of rods in many round-pupilled Colubridae, this information should be of value in interpreting their nocturnal behavior.

196. Spiteri, D. E. 1987. Taxonomy of the rosy boa (Lichanura) with a description of a new subspecies (Baja California, Mexico). M.A. California State University, Fullerton. 130 p.

Univariate and multivariate statistical analyses were performed on 347 *Lichanura* individuals. Conclusions of this study are: 1) there is only one species of *Lichanura*: *L. trivergata* 2) subspecies *L. t. gracia* and *L. t. bistici* are invalid 3) *L. roseofusca* is reduced to a subspecies 4) *L. myriolepis* is resurrected as a subspecific name and 5) a new subspecies *L. t. saslowi* is described from Baja California, Mexico.

197.Stewart, G. R. 1964. Thermal ecology of the garter snake
Thamnophis sirtalis concinnus (Hallowell) and Thamnophis ordinoides (Baird and Girard). PhD. Oregon State University. 96 p.

The thermal ecology of Thamnophis sirtalis concinnus and T. ordnoides was studied. Thamnophis sirtalis is the most wide-ranging snake in the United States. Commonly found near permanent water, it is occasionally encountered in rather dry situations. In contrast, T. ordinoides is a strictly terrestrial northern Pacific Coast form, which typically is associated with areas of dense vegetation. T. s. concinnus is often seen basking on mild days of the coldest winter months (Nov.-Feb.) while T. ordinoides rarely emerges during these months.

The distinct differences in habitat preference and winter behavior exhibited by these snakes suggest differences in thermal preference and critical levels. Through studies of body temperature in the field and a gradient box, critical thermal maximum and minimum, and metabolic rate, tentative conclusions were reached which support the idea of differences in thermal preference and critical levels.

198. Thompson, J. F. 1984. Multivariate techniques in the systematic analysis of the kingsnake genus Lampropeltis with emphasis on intraspecific variation: A preliminary study. PhD. The University of Tennessee. 301 p.

Five species of Lampropeltis were studied using cluster analysis, factor analysis, multiple regression, and discriminant analysis. The species were L. calligaster, L. getulus, L. zonata, L. pyromelana, and L. triangulum. The data analyzed included meristic, metric and eidostic data. Discriminant analysis proved the most useful in drawing conclusions on infraspecific variation.

199. *Weisman, C. M. 1988. Morphometric and electrophoretic comparison between pacific rubber boa (Charina bottae bottae) and the southern rubber boa (Charina bottae umbratica). MS. California State Polytechnic University, Pomona. 44 p.

Turtles/Tortoises

200. Bury, R. B. 1972. Habits and home range of the pacific pond turtle, Clemmys marmorata, in a stream community. PhD. University of California, Berkeley. 205 p.

A mark and recapture study of pond turtles was conducted. Short and long term movement was measured showing males' home range was twice that of females' and that juveniles were sedentary. Methods of body temperature regulation were also monitored and aggressive behavior during times of basking was noted as a probable factor in spacing of turtles.

201. Friar, W. F. 1962. Comparative serology of turtles with systematic implications. Ph.D. Rutgers University. 166 p.

Studies have been made with blood from turtles and a few other organisms, a certain number of the study animals having been injected with antigenic material. Procedures involved electrophoresis; agglutination with iso- and heteroagglutinins and some tanned erythrocytes; precipitation in fluid systems, cellulose acetate, and agar. Most antibodies used in precipitation testing were produced in rabbits and chickens.

202. *Holland, D. C. 1985. An ecological and quantitative study of the western pond turtle (Clemmys marmorata) in San Luis Obispo county, California. M.A. California State University, Fresno.

203. Hulse, A. C. 1974. An autecological study of Kinosternon sonoriense LeConte (Chelonia: Kinosternidae). PhD. Arizona State University. 116 p.

This study was conducted on two Arizona populations of Kinosternon sonoriense at different elevations. Differences were revealed in reproduction growth rate, diet, and density. The Tule Stream population (610m) breeds in March and April and lays eggs from late May to September. These females produce 2 clutches per year. Tule Stream turtles stop growing after 4 years and reach sexual maturity at a smaller size and younger age than the Sycamore Creek (1200m) population.

Breeding at Sycamore Creek occurs only in April. Egg-laying is only from May to July and only one clutch per

year is produced. Sycamore Creek turtles grow beyond 4 years. These turtles were more carnivorous than Tule Stream turtles. Density at Tule Stream was 330 per acre, Sycamore Creek was not as dense.

204. Marlow, R. W. 1979. Energy relations in the desert tortoise, *Gopherus agassizii*. PhD. University of California, Berkeley. 158 p.

A population of desert tortoise, *Gopherus agassizii*, in the Mohave Desert was observed to examine the energy relations of these animals. An annual time-energy budget was constructed and the population was determined to have a positive energy balance.

205. Patterson, R. G. 1971. Vocalization in the Desert Tortoise, *Gopherus agassizi*. M.A. California State College at Fullerton. 152 p.

Vocalizations in *Gopherus agassizi* occur at body temperatures between 21 and 30°C. The complexity, variation, and frequency of calling appear to increase with the age of the tortoise. Vocalizations are also closely related with behavioral patterns.

206. *Rosen, P. C. 1987. Variation of female reproduction among populations of Sonoran mud turtles (*Kinosternon sonoriense*). M.S. Arizona State University, Tempe.

207. Webb, R. G. 1961. Recent softshell turtles of North America (Family, Trionychidae). PhD. University of Kansas. 498 p.

This paper discusses the characteristics of the genus *Trionyx* in North America. Discussion in relation to physical characteristics, geographic variation and phylogenetic relationships is provided.

ACKNOWLEDGMENTS

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